REMARKS

The Specification is objected to under 35 USC § 112, 37 CFR § 1.71(a) – (c) for allegedly failing to disclose the limitations of claims 8-10. Likewise, claims 8-10 are rejected under 35 USC § 112, first paragraph.

Claim 9 stands rejected under 35 USC § 112, second paragraph.

Claims 7-8, 10 and 12 stand rejected under 35 USC § 102(e) as being anticipated by US Patent 5,159,972 (hereafter Gunnerson).

Claims 9, 11, 21, 28 and 30 stand rejected under 35 USC § 103 as being obvious over Gunnerson in view of US Patent 5,917,699 (hereafter Hung) and US Patent 5,661,637 (hereafter Villaume).

Claims 17-20, 27 stand rejected under 35 USC § 103 as being obvious over Gunnerson in view of Hung.

Claim 29 stands rejected under 35 USC § 103 as being obvious over Gunnerson in view of US Patent 3,604,503 (hereafter Feldman).

With respect to the § 112, first paragraph rejection of claims 8-10 and the associated objections to the specification, applicant has amended claim 9 to fix the accidental juxtaposition of first and second. Additionally, applicant notes applicant's specification at page 15, line 22, which states "[f]or example, θ_1 may be at least twice θ_2." Additionally, page 13, lines 3-6 detail an embodiment in which one thermal path has approximately four times the thermal conductivity of the other path. Additionally, applicant notes that claims 8 and 10 are substantially similar

with respect to the thermal conductivity recited when originally filed. These claims alone in the original filing are sufficient to satisfy § 112, first paragraph. Thus, both applicant's originally filed specification and claims describe two thermal paths with the ratios described in these claims. Accordingly, applicant submits that applicant's specification and claims fully comply with 37 CFR § 1.71 and 35 USC § 112, first paragraph.

With respect to the § 112, second paragraph rejection of claim 9, applicant has amended claim 9 to depend on claim 8, thereby fixing the antecedent problem.

With respect to the § 102(e) rejection of claims 7-8, 10 and 12, applicant respectfully disagrees. In order to anticipate a claim under 35 USC § 102(e), each and every element of that claim must be shown in the reference. In claim 7, applicant claims:

> 7. A heat exchanger comprising
> a first heat dissipation mechanism having a first heat dissipation capacity;
> a second heat dissipation mechanism having a second heat dissipation capacity;
> a variable thermal conductivity heat pipe having a first portion thermally coupled to a heat generating component, a second portion thermally coupled to the first heat dissipation mechanism, and a third portion separated from the first portion and the second portion by a limited conductivity portion and thermally coupled to the second heat dissipation mechanism.

Gunnerson does not meet the limitations of this claim for several reasons. First, Gunnerson does not teach or suggest the use of two separate heat dissipation mechanisms that are thermally coupled to different portions of a heat pipe. Gunnerson includes a single fan that expedites the flow of air. The flow of air first passes over a lower portion of the heat pipe 13, through the fan 25, around a corner, and then over the upper portion of the heat pipe 11. Additionally, there is a set of cooling coils 27 provided.

There is no heat dissipation mechanism coupled to the upper portion of the heat pipe 11. The air that flows over the top portion is the same air as flows over the bottom portion. Moreover, the fan and cooling coils cannot be said to be two different heat dissipation

mechanisms coupled to different portions of the heat pipe because, if anything, these two elements would be coupled to the same portion of the heat pipe, the lower portion 13. The air from the lower portion passes through fan 25 and coils 27. Air from different portions does not pass over these mechanisms.

Secondly, Gunnerson's heat pipe itself cannot even be said to be a heat dissipation mechanism, much less two heat dissipation mechanisms. The system of Gunnerson is suggested for use in dehumidification of air in an air conditioning system (see Col. 2, lns. 28-30). Gunnerson's system may in fact transfer some heat from the incoming air (absorbed by heat pipe lower portion 13) back to the air (dissipated by the heat pipe upper portion 11) because the air may have been over-cooled by the cooling coil 27. See, e.g., Col. 2, lns. 2-6:

> The air, which has been dehumidified and over-cooled upon leaving the cooling coil, is re-heated to a comfortable temperature using the waste heat extracted from the return air.

Thus, the top and bottom portions of the heat pipe do not dissipate heat from the flow of incoming air. Rather, they transfer variable amounts of heat from the incoming air to the outflowing air. The only heat removal is by the cooling coil. Thus, there are no two heat dissipation mechanisms.

Thirdly, the apparatus of Gunnerson is not coupled to a particular heat generating component. The system of Gunnerson is suggested for use in dehumidification of air in an air conditioning system (see Col. 2, lns. 28-30). In such systems, air that is generally in an uncomfortable or undesirable state is cooled. There is no suggestion of using this exchanger system by coupling it to a particular heat generating component. It is not surprising that there is no such suggestion. The system of Gunnerson does not appear to be focused on cooling as would usually be done for a particular electronic component because the exhaust air is re-heated

by the heat emitted from the upper portion of the heat pipe 11.

With respect to claims 8 and 9, Gunnerson does not teach or suggest the use of two different paths matched to heat dissipation capacities. As explained above, Gunnerson does not include two heat dissipations mechanisms coupled as claimed by applicants. Therefore, no thermal conductivity ratios for these paths are described.

With respect to claim 10, Gunnerson does not teach or suggest enabling the fan depending on a temperature of the heat generating component. In fact, the continuous operation of the fan 25 appears to be crucial to the proper functioning of Gunnerson's system.

With respect to claim 17, applicant submits that, generally speaking, analogous arguments to those advanced above with respect to claim 7 are applicable and persuasive with respect to claim 17. Claim 17, however, has different claim limitations. Claim 17 recites an electronic component. Gunnerson does not teach or suggest the cooling of a specific electronic component. Moreover, Gunnerson does not include first or second heat dissipation mechanisms as described above. Finally, applicant notes that there is no teaching or suggestion that would motivate one to combine Gunnerson's humidity reduction heat exchanger with a computer system. Gunnerson's bulky system with cooling coils, reservoirs, and valves would not be readily adaptable to use in a system such as a modern computer or processing system with electronic components which often are placed in close proximity for processing performance reasons.

With respect to claim 19 (see also claim 12), applicant now claims that the electronic component is coupled to the variable thermal conductivity heat pipe. Although the language "coupled" does not require a direct physical connection, at least an indirect physical connection exists (e.g., thermal transfer blocks or other heat conductive materials may be interposed).

Gunnerson does not teach or suggest a connection to a heat generating component or an electronic component. Such a connection would be illogical given the functionality and recommended uses of Gunnerson.

With respect to claim 20 (see also claim 12), applicant submits that Gunnerson does not teach or suggest that the variable conductivity heat pipe is a single sealed tubular member which is uniformly tubular except for the limited conductivity portion which is narrowed. Moreover, Feldman does not suggest a sealed tubular member which is uniformly tubular except for the narrowed portion.

With respect to claim 27, applicant submits that, generally speaking, analogous arguments to those advanced above with respect to claims 7 and 17 are applicable and persuasive with respect to claim 27. Claim 27, however, has different claim limitations. Claim 27 (see also claims 11, 21) recites that a heat dissipation plate is used as one heat dissipation mechanism and a fan is used as a second heat dissipation mechanism. In order that less heat be directed to the heat dissipation plate, a limited conductivity portion separates the heat generating element from the heat dissipation plate. None of the prior art teaches or suggests using a limited conductivity portion of a heat pipe to direct more heat to a fan than a heat dissipation plate. Thus, applicant submits that these claims are clearly patentable over the prior art.

Applicant submits that all claims now pending are in condition for allowance at least by way of dependency on an allowable independent claim. Such action is earnestly solicited at the earliest possible date. If there is a deficiency in fees, please charge our Deposit Acct. No. 02-2666.

Respectfully submitted,

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Conny Willesen — 10-31-01
Signature — Date

APPENDIX A

VERSION OF CLAIMS WITH

MARKINGS TO SHOW CHANGES MADE

7. A heat exchanger comprising

a first heat dissipation 430 mechanism having a first heat dissipation capacity;

a second heat dissipation 440 mechanism having a second heat dissipation capacity;

a variable thermal conductivity 400 heat pipe having a first 405 portion thermally coupled to a heat generating 205 component, a second 415 portion thermally coupled to the first heat dissipation 430 mechanism, and a third 410 portion separated from the first 405 portion and the second 415 portion by a limited conductivity 410 portion and thermally coupled to the second heat dissipation ?/440 mechanism.

8. The heat exchanger of claim 7 wherein the variable thermal conductivity heat pipe has a first thermal path with a first thermal conductivity which couples the heat generating component to the first heat dissipation mechanism and has a second thermal path with a second thermal conductivity which couples the heat generating component to the second heat dissipation mechanism and wherein the first thermal conductivity is at least twice the second thermal conductivity and the first heat dissipation mechanism is an active heat dissipation mechanism.

9. (Twice Amended) The heat exchanger of claim [7]8 wherein the heat generating component is a processor and wherein the [second]first thermal conductivity is approximately four times the [first]second thermal conductivity.

10. (Amended) The heat exchanger of claim 7 wherein the first heat dissipation mechanism is an active heat dissipation mechanism that is enabled depending on at least [the]a temperature of the heat generating component.

11. The heat exchanger of claim 7 wherein the first heat dissipation mechanism is a fan based heat exchanger and wherein the second heat dissipation mechanism is a thermally conductive plate beneath and substantially parallel to a keyboard.

12. (Amended) The heat exchanger of claim 7 wherein said heat generating component is an integrated circuit that is coupled to the first portion of the variable thermal conductivity heat pipe, and further wherein said variable conductivity heat pipe comprises a single sealed tubular member which is uniformly tubular except for the limited conductivity portion which is

narrowed[11 wherein the second heat dissipation capacity is determined in part by a maximum acceptable operating temperature for the keyboard].

17. A system comprising:

an electronic component;

a variable thermal conductivity heat pipe having a first portion and a second portion separated by a throttling portion, the electronic component being thermally coupled to the first portion; and

a first heat dissipation mechanism thermally coupled to the first portion of the variable thermal conductivity heat pipe; and

a second heat dissipation mechanism thermally coupled to the second portion of the variable thermal conductivity heat pipe.

18. The system of claim 17 wherein the first heat dissipation mechanism is a fan based heat exchanger including a fan and a plurality of fins which are directly welded to the heat pipe.

19. (Amended) The system of claim 18 wherein said electronic component is coupled to said first portion of said variable thermal conductivity heat pipe[wherein the plurality of fins are directly welded to the heat pipe].

20. (Amended) The system of claim 18 wherein said variable conductivity heat pipe comprises a single sealed tubular member which is uniformly tubular except for the limited

conductivity portion which is narrowed [wherein the plurality of fins are integrally formed with the heat pipe].

21. The system of claim 18 wherein the second heat dissipation mechanism is a heat dissipation plate affixed beneath and substantially parallel to a keyboard.

27. An apparatus comprising:

at least one electronic component;

a heat pipe having a limited conductivity portion, the heat pipe having a first portion thermally coupled to the at least one electronic component;

a fan based heat exchanger thermally coupled to a second portion of the heat pipe;

a metallic plate coupled to a third portion of the heat pipe and separated from the first portion that is connected to the at least one electronic component by the limited conductivity portion of the heat pipe.

28. The apparatus of claim 27 wherein the metallic plate comprises a plate substantially beneath a keyboard.

29. The apparatus of claim 27 wherein said limited thermal conductivity portion of said heat pipe comprises a narrowed portion of said heat pipe.

30. The apparatus of claim 28 wherein the metallic plate comprises a portion of a thermally enhanced keyboard.

31. (New) The apparatus of claim 27 wherein said electronic component is a processor and is coupled to said first portion of said heat pipe.

32. (New) The apparatus of claim 27 wherein said heat pipe is a uniform and sealed heat pipe except for the limited conductivity portion which is narrowed.